

*The motor spindle is the heart of every modern machine tool. Depending on its size, it can transmit up to 180 kW of power, and it always requires the right cooling and lubrication. The pioneering Spindle Line from MOTOREX includes all operating fluids needed for spindle systems and is a valuable element in assuring process dependability.*



# MOTOREX SPINDLE LINE

A recent survey resulted in the following analysis of the causes of spindle malfunctions: 42% wear on spindle bearings, 33% collisions (!), 15% other and 5% each due to dirt and lubrication. While many users are aware of the key importance of the spindle system, few take full advantage of the available room for optimization, especially considering that the investment in a high-frequency spindle averages 10–15% of the cost of the entire machine. MOTOREX's Spindle Line creates an ideal environment for reducing spindle malfunctions and enhancing process reliability.

## SPINDLE BEARING LUBRICATION

Heavy-duty spindle bearings are lubricated using one of three systems:



■ lubrication

### GREASE-LUBRICATED SPINDLE BEARINGS

This system uses sealed, grease-lubricated bearings in conventional spindles. The bearings are lubricated with a ball-bearing grease in accordance with the manufacturer's recommendations.



### DIRECT LUBRICATION SYSTEM (DLS)

This system meets the very highest requirements. A mixture of oil (SPINDLE LUBE OIL HYPERCLEAN) and air is injected radially straight into the bearing zone with the heaviest loads.



### OIL-AIR BEARING LUBRICATION

Like DLS, suitable for the most stringent requirements. A mixture of oil (SPINDLE LUBE OIL HYPERCLEAN) and air is injected axially – i.e. from the side – straight into the bearing zone.

## SPINDLE BEARING LUBRICATION BY OIL

### SPINDLE LUBE HYPERCLEAN

Special spindle bearing lubricant (DIN 51 524/T2) for spindle systems that are subject to heavy stressing.

- ultra-fine filtered to purity class 15/13/10 (ISO 4406)
- results in significantly longer bearing service life
- best bearing lubrication and cooling
- wear-reducing additives
- rapid air separation characteristics (no foaming)

### HYPERCLEAN IN FILTER TEST

At MOTOREX, HYPERCLEAN stands for ultra-pure quality. At 40,000 rpm, even the tiniest dirt particle can have a devastating impact on a spindle's service life (see filter sample):



Conventional spindle oil 20/18/15



MOTOREX SPINDLE LUBE HYPERCLEAN 15/13/10



## SPINDLE CLEANING

Thorough cleaning of the system is recommended every time the spindle coolant is changed (either during maintenance or when switching to a water-based spindle coolant). The ideal conditions for a smoothly functioning cooling system only exist after cleaning.

### SPINDLE CLEANER (WATER-BASED)

#### CS-CLEANER

Special VOC-free and biocide-free cleaner for spindle cooling systems that use water-based coolants. Effectively dissolves dirt residues and other contamination.

- very high cleaning effectiveness
- biocide-free
- dissolves oily and greasy residues
- pH neutral
- compatible with all materials

#### REDUCED MAINTENANCE EFFORT

Spindle Line products are designed for a long service life so they measurably reduce maintenance effort.



## SPINDLE COOLING

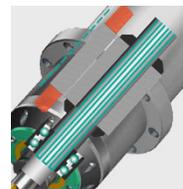
Depending on the design and manufacturer, cooling spindles use either water-based or oil-based coolants. Controlled cooling and thermal stability of the spindle, and increasingly of its periphery, is a basic necessity for precise machining in the micron range. Two cooling circuit systems are used:



#### MOTOR AND BEARING COOLING

Motor and bearing cooling is carried out using spindle coolants COOL-X (water-based) or COOL OIL (oil-based). The coolant circulates through a cooler in a closed circuit.

■ cooling



#### SPINDLE SHAFT COOLING

Cooling the spindle shaft with COOL CORE READY (water-based) or COOL OIL (oil-based) spindle coolant reduces warm-up times and increases thermal stability as a key factor in dimensional accuracy.

### WATER-BASED SPINDLE COOLANT

#### COOL-X READY-TO-USE

Ready-to-use spindle coolant for long-term use with corrosion protection for high-performance spindles. Has nearly the same heat dissipation characteristics as water.

- excellent heat dissipation properties
- protects all materials against corrosion
- ready-to-use
- low-maintenance thanks to Long Life technology

#### COOL CORE READY-TO-USE

Ready-to-use spindle coolant for spindle shaft cooling with protection against corrosion. Specially designed for the powerful centrifugal forces in the spindle shaft.

- excellent heat dissipation properties
- protects all materials against corrosion
- ready-to-use
- low-maintenance thanks to Long Life technology

### OIL-BASED SPINDLE COOLANT

#### COOL OIL

Special VOC-free and aromatic-free spindle coolant oil with high-quality characteristics.

- efficient heat dissipation
- ideal viscosity-temperature curve
- outstanding protection against corrosion
- low-maintenance thanks to Long Life technology

#### CLEAN SPINDLE COOLING JACKET

The way high-performance spindles are cooled has a crucial impact on their performance, service life and precision. MOTOREX's spindle coolants are perfect for the job.



With MOTOREX spindle coolant

With insufficient-quality coolant

MOTOREX has worked for many years with leading spindle manufacturers who recommend MOTOREX Spindle Line products for use around the world and distribute them in their own countries. Your MOTOREX industry specialist will be glad to help if you any questions about spindle operating fluids. •